RESTRUCTURED POWER SYSTEMS

PEC-III: EPS

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
BPSB13	Elective	3	0	0	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

I. **I. COURSEOVERVIEW:**

This course introduces the differences between conventional power system and restructured power system. The course provides restructuring experiences of different countries with special focus on Indian power system. It elaborates the design of power markets, market architectural aspects, changes in operational aspects with new operational challenges like congestion management. It provides an insight to develop economically efficient power system.

II. COURSEOBJECTIVES:

The course should enable the students to:

I. Understand what is meant by restructuring of the electricity market.
II. Explain the need behind requirement for deregulation of the electricity market.
III. Describe the money, power and information flow in a deregulated power system.

III. COURSEOUTCOMES

After successful completion of the course, students will be able to:		
CO 1	**Explain** deregulation of electric utilities in view of technical and economic issues in power industry.	Understand
CO 2	**Analyze** the consumer and supplier behavior with the principle of demand and supply elasticity	Analyze
CO 3	**Interpret** the restructured power systems across the world based on market architecture.	Understand
CO 4	**Analyze** the different pricing mechanisms to encourage efficient economic behavior	Analyze
CO 5	**Examine** transmission network usage pricing and loss allocation methods to ensure reliable and secure operation of power system.	Analyze
CO 6	**Interpret** congestion in transmission network with respect to ATC, TTC, TRM and CBM	Understand

IV. SYLLABUS

OBJECTIVES:

The course should enable the students to:

I. Understand what is meant by restructuring of the electricity market.
II. Explain the need behind requirement for deregulation of the electricity market.
III. Describe the money, power and information flow in a deregulated power system.

UNIT-I	OVERVIEW OF RESTRUCTURED POWER SYSTEM	Classes: 09

Regulation and deregulation, vertically integrated and deregulated power industry, market models, market clearing price(MCP), independent system operator(ISO), role of ISO, Ancillary service management, deregulation in Power Industry (Technical and Economic Issues).

UNIT-II	ECONOMIC CONSIDERATIONS IN RESTRUCTURED POWER SYSTEM	Classes: 09

Introduction, Consumer and Supplier behavior, Demand elasticity, Supply elasticity, Short-run and Long-run costs,

various costs of production. Electricity pricing: Electricity pricing in generation, transmission and distribution, Introduction to Marginal cost, opportunity Costs, Dynamic pricing mechanism (ABT), Price elasticity of demand, Tariff setting principles, Distribution tariff for HT and LT consumers.

UNIT-III	GLOBAL AND INDIAN MODELS OF RESTRUCTURED POWER SYSTEM	Classes: 10

Global models of restructured power system: Market evolution and deregulation in UK, USA, South America, Nordic pool, China, PJM ISO, and New York market.

Indian power market evolution: Electricity Act 2003 and various national policies and guidelines, Ministry of Power, Role of CEA, CERC, state ERC, load dispatch centers etc., implications of ABT tariff on Indian power sector, introduction to Indian power exchange.

UNIT-IV	TRANSMISSION PRICING AND CONGESTION MANAGEMENT	Classes: 08

Transmission price components, various transmission pricing mechanisms, tracing of power, network usage and loss allocation; Introduction to congestion in transmission network, methods of congestion management.

UNIT-V	OASIS	Classes: 09

Introduction of OASIS, Structure of OASIS, Pooling of information, transfer capability on OASIS and various concepts like ATC, TTC, TRM, and CBM.

Text Books:

1. Mohammad Shahidehpour, Muwaffaq Alomoush, "Restructured electrical power systems: operation, trading and volatility", Marcel Dekker. 2nd Edition, 1998.
2. Prayas Energy Group, Pune, "Know Your Power", A citizens Primer on the Electricity Sector, 2nd Edition,2002.

Reference Books:

1. Daniel Kirschen, GoranStrbac, "Fundamentals of Power System Economics", John Wiely& Sons Ltd.2004
2. Kankar Bhattacharya, Jaap E Daadler, Math H J Boolen, "Operation of Restructured Power Systems", Kluwer Academic Pub., 1st Edition,2001.
3. Steven Stoft, "Power System Economics: Designing Markets for Electricity", John Wiley and Sons, 1st Edition, 2002.
4. Sally Hunt, "Making competition work in electricity", John Wiely& Sons, Inc., 1st Edition,2002
5. Loi Lei Lai, "Power System Restructuring and Deregulation" John Wiley and Sons, 1st Edition,2001.

Web References:

1. https://www.nptel.ac.in/courses/108101005
2. https://epdf.tips/restructured-electrical-power-systems-power.

E-Text Books:

1. shodhganga.inflibnet.ac.in/bitstream/10603/17295/13/13_chapter3.pdf